

complete. It forms the best monograph on the subject yet written. The origin of petroleum is so treated as to present the various theories put forward to account for its occurrence; necessarily, no authoritative decision can be given on this very debatable question. Concerning the occurrence of sulphur in the petroleum from Ohio and Canada, those interested would do well to supplement the bare mention of the fact here given by reference to the July number of the *Journal* of the Franklin Institute, where C. F. Mabery gives an account in which the subject is treated as its importance requires. Warren is stated by Mr. Redwood to have isolated hydrocarbons of the C_nH_{2n} series, termed naphthenes by Markownikoff. Mr. Mabery shows that the Ohio and Canadian petroleum does not yield the naphthenes of Markownikoff and Ogloblin, but give hydrocarbons of the C_nH_{2n+2} series of similar boiling points. This writer also proves conclusively the presence of benzene, toluene, and xylenes in these petroleum.

The manufacture of shale oil gives yet another instance of the application of continuous processes; the text contains very lucid descriptions of these, well and sufficiently illustrated. Few of the general public can have any adequate conception of the number and variety of lamps in existence for use with oils. An exhaustive account is given of these, and the advantages or disadvantages characteristic of the main types of oil-lamps are dwelt upon at sufficient length to enable an intelligent judgment to be formed as to the suitability of any particular lamp for the work required from it.

The Section on safety-lamps, with which this volume concludes, has been contributed by D. A. Louis, in conjunction with Boverton Redwood. It gives by no means the least interesting reading. Although the excellent account of the lamp-indication of fire-damp is highly technical, and calculated to be eminently useful to specialists, the general reader will find no difficulty in grasping the principles involved, and will much appreciate the clearness with which this important subject is treated.

It may be hoped that the high standard exhibited in this volume will be maintained in volume iii., announced as to appear shortly. The editors are certainly to be congratulated on the excellent production now before us.

W. T.

OUR BOOK SHELF.

Science Readers. By Vincent T. Murché. Book iv. Pp. 216. (London: Macmillan and Co., 1895.)

THE conversational method of instruction, which used to be so general in school books, is not one that leads to pleasant memories. Mr. Murché has created two boy prodigies in his "Science Readers," and they ask and answer questions of a teacher whose laudable ambition is to elicit and impart all kinds of scientific knowledge upon every suitable or unsuitable occasion. We reverence that teacher for his patience and for his ability to find texts in everything. The pity of it is, that lessons given in this way on all and sundry topics lack the quality which lies at the base of all true scientific knowledge, viz. the orderly arrangement of facts. A lesson on solids, liquids, and gases precedes one on our bodies, another on gravity precedes a lesson on vertebrates and invertebrates. A lesson on the classification of invertebrates is wedged between two on hydrostatic pressure,

and so on throughout the book. Possibly the variety is introduced to charm the youthful mind, but it is not a desirable attribute of the book; for the method must result in the acquisition of unconnected information, and such knowledge has little to commend it. In the matter of illustration, and simplicity of language, the book leaves little to be desired.

A Garden of Pleasure. By E. V. B. Pp. 220. (London: Elliot Stock, 1895.)

A FEW chapters fresh with the fragrance of common country flowers, and breathing the life of "lustrous woodland." Here and there the authoress lapses into sentiment, but, taken as a whole, her language is attractive in its simplicity. The changes that go on in organic nature from month to month are drawn with careful touch, and many students of botany would derive benefit from the contemplation of the sketches.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

The "4026.5" Line and D_3 .

MAY I call attention to the fact that the line at 4026.5, now recognised as belonging to the spectrum of helium, and conspicuous in the Orion stars, is also prominent in the spectrum of the solar chromosphere. Although not given in the catalogue of chromosphere lines (which dates from 1872), it was observed and published as long ago as 1883 (*Am. Jour. Sci. and Art.*, November 1883), in connection with another line at 4092, seen at the same time. Since then the 4026 line has been observed repeatedly, and might be given a place in the catalogue with a relative frequency of about 15, and a brightness of 3 or 4. Like the other helium lines it has no dark analogue in the ordinary solar spectrum. The 4092 line falls upon a strong double line shown upon Rowland's map, but I am not sure to which of the two components it belongs; it is faint, and seldom seen.

While D_3 rarely appears as a dark line upon the solar spectrum, yet in the course of over twenty years I am able to count up a considerable number of instances; certainly not less than twenty or thirty. The phenomenon occurs usually in the penumbral region of an active sun-spot, which in its nucleus reverses the lines of hydrogen, magnesium, and sodium, and sometimes D_3 itself. By a slight motion of the telescope as one passes away from the nucleus, it crosses regions where D_3 appears as a smoky shade: on page 130 of "The Sun" I have figured a typical case.

I have not yet been fortunate enough to see the duplicity of D_3 myself, but Prof. Reed has observed it on several occasions. Hanover, N.H., August 26. C. A. YOUNG.

On the Temperature Variation of the Thermal Conductivity of Rocks.

NATURE reproduces the results obtained by Lord Kelvin, P.R.S., and J. R. Erskine Murray, a paper read at the Royal Society, May 30, "On the Temperature Variation of the Thermal Conductivity of Rocks." These gentlemen arrived at the following results: "(§ 13). . . that for slate with lines of fluor parallel to cleavage planes, the mean conductivity in the range from 123° C. to 202° C. is 91 per cent. of the mean conductivity in the range from 50° C. to 123° C., and for granite the mean conductivity in the range from 145° C. to 214° C. is 88 per cent. of the mean conductivity in the range from 81° C. to 145° C."

These results are so widely different from those I obtained by another method, and which Lord Kelvin had the kindness to publish in NATURE, March 7, 1895, p. 439, that I must be allowed to introduce here a word of objection.

It seems to me that details of experimental dispositions are important enough, and should be trustworthy. It is however, not opportune to discuss them minutely now.

The experimenters based their work on the case of Fourier's

"indefinite wall," which is characterised by the fact that temperature differences in the parallel planes are exactly proportional to the distances of these planes. According to the experiment, they get the result that this proportionality does not exist, and that conductivity varies much according to temperature.

In my opinion, this absence of proportionality arrived at, proves rather that the experimental conditions were defective, and are in contradiction with the hypothesis of the "indefinite wall" case.

I admit, in principle, the employed method, but I think it should be modified until—for the same temperature of the bath, the said proportionality should be obtained; then, in a new experiment, the temperature of the bath being higher, it should be verified if the proportionality and the conductivity remain, or if the last increases or diminishes with the temperature.

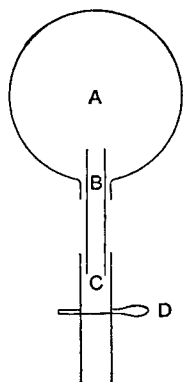
Neuchâtel, August.

ROBERT WEBER.

Experimental Mountain-building.

PROF. JOHANNES WALTHER, of Jena, requests me to communicate to you the following details regarding an interesting experiment which he has recently devised for teaching purposes: it is intended to explain mountain-formation.

He compares the system of folds on the surface of our slowly-ageing earth to the wrinkles which form on the skin of a drying apple, and points out that the height of our mountain-chains in relation to the mass of the globe is precisely comparable to the wrinkles on the skin of the apple. In order to demonstrate the formation of these folds, he takes an indiarubber balloon (A), and attaches to it a bit of glass tubing (B). On to this is stretched a piece of indiarubber tubing (C), which is pinched close by the stopcock (D). When the indiarubber balloon is blown out to its full capacity, it is spread over with a layer of flour-paste two millimetres thick, and is then dipped and



twirled round and round in dry wheaten flour until a perfectly smooth crust, three to four millimetres in thickness, covers the whole sphere. The balloon is then placed on a tripod, so that the indiarubber tubing (C) dips exactly into a glass of water standing below. Thereupon the stopcock is turned open, and the air is allowed to escape in single bubbles; the volume of the ball is lessened, and lateral pressure makes itself immediately felt in the paste-crust. Small folds gradually grow bigger, single folds unite to form systems of folds, flat areas of depression sink deeper and deeper, and the neighbouring folds twirl and cross over the depression. The features of the Cordilleras, of the Jura, and many other well-known tectonic relations are thus reproduced with striking accuracy. Whenever it is desired to repeat the experiment, one need simply blow the balloon out again, smooth out the folded surface by dipping and twirling in dry flour, and all is ready for another demonstration.

London, August 26.

L. BELINFANTE.

Joseph Thomson.

IN Mr. Gregory's sympathetic notice (NATURE, p. 440) of Joseph Thomson, he hardly does justice to the memory of the deceased traveller in relation to the scientific results of his expeditions; at least so far as botany is concerned. During his too short career Thomson presented three considerable collections of dried plants to Kew. The first, which appears to

have been made on his own initiative, chiefly between Lake Nyassa and Lake Tanganyika, was secured for Kew in 1880, through the instrumentality of the late Colonel J. A. Grant, F.R.S. This was not the subject of a special paper; yet it contained a number of interesting novelties, some of which have from time to time been published in Hooker's "Icones Plantarum" and elsewhere. Before going out again Thomson carefully studied the means by which his collecting opportunities might be turned to the greatest advantage. Armed with this knowledge he collected even more successfully in the Kilimanjaro and other mountains of Eastern Equatorial Africa. This second collection reached Kew in September 1884, and proved of the greatest scientific importance, being the first adequate illustration of the mountain flora of that region. It contained scarcely 150 species; but the specimens were selected with admirable judgment, and were sufficient for all purposes. It was worked out by Sir Joseph D. Hooker and Prof. D. Oliver, and the very important results recorded in the twenty-first volume of the *Journal* of the Linnean Society. This paper and Thomson's collection will always rank among the classical documents for the study of the phytogeography of Central Africa. Subsequently Mr. Thomson sent to Kew the botanical fruits of his journey to the Atlas Mountains, and although they contained very few previously unknown plants, they were none the less instructive as a sample of the flora of that comparatively little-known part of the world. Had he preserved his health Thomson might have taken his place in the first rank of botanical explorers. He had acquired the rare gift of selection in collecting; of knowing what to secure and what to neglect.

W. BOTTING HEMSLEY.

Late Nestlings.

TO-DAY I observed nests of the house-martin underneath the eaves of the clock-tower at Lamlash Pier, on the south and west sides. The parents were busy feeding their young, whose cries I heard. Surely this is a late date for a migratory bird. How are these nestlings to get across the ocean? JAS. SHAW.

Barrhead, September 7.

THE INSTITUTE OF FRANCE.

IN a few weeks, at the end of October, the Institut National de France is to celebrate its first centenary. Some words concerning its origin and organisation may be of interest at the present moment.

The Institute is the outcome of a previous scientific society, entirely due to individual initiative. During the first half of the seventeenth century, a few men, between whom love of science was a firm bond, agreed to meet at regular intervals at the house of one of their number, informally, in order to exchange views, to keep each other posted up on their various researches, and to make up an unconventional assembly of congenial spirits. It was more of a temporary or intermittent club than a real society, as we understand the latter now. These men were mostly mathematicians and physicists—for at that time natural science was more in the *werden* than in the *sein* state—and Mersenne, Descartes, Blaise Pascal, Gassendi, are some of them. Their meetings soon attracted public attention, and the great Colbert, anxious for the development of the arts of peace after the Pyrenees treaty had put an end to the war, considered them as being of sufficient importance and utility to take an interest in them, and to support the incipient society officially.

Colbert even made out a full plan of what was to be realised 200 years later; what he organised was a body of scientific men who were to meet at regular intervals, and were divided into three classes—historical scholars, literary men, and, finally, scientific men. The private society of mathematicians and physicists grew into the Académie des Sciences, and each of the three academies met separately in the Bibliothèque du Roi, at Colbert's own residence. The king, as a sign of his approval, gave some money for experiments, and some pensions.